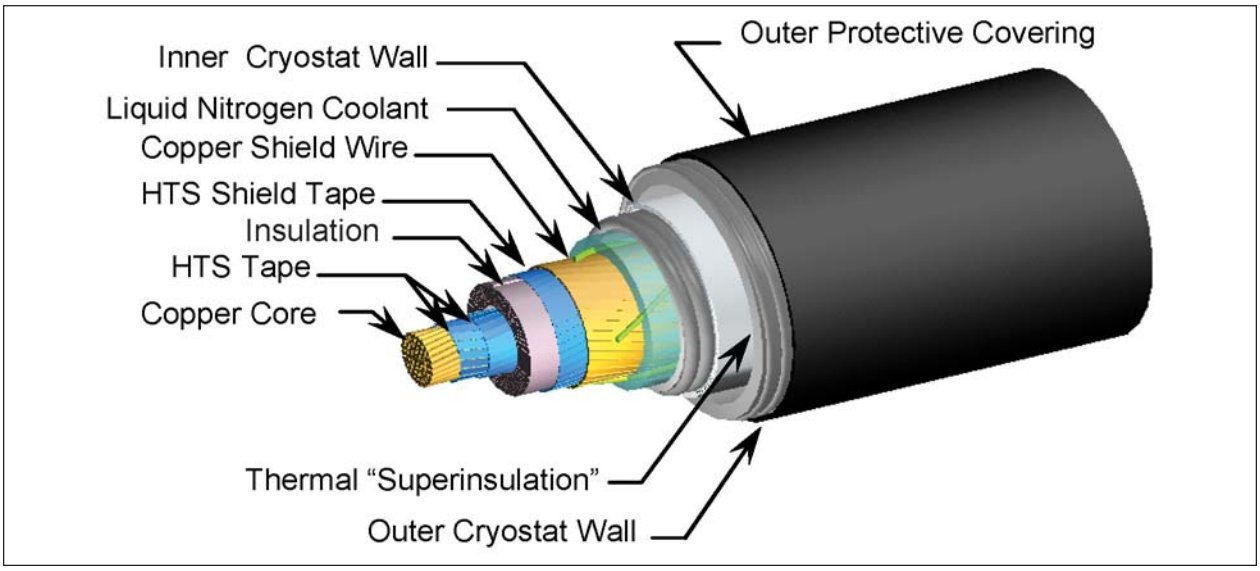
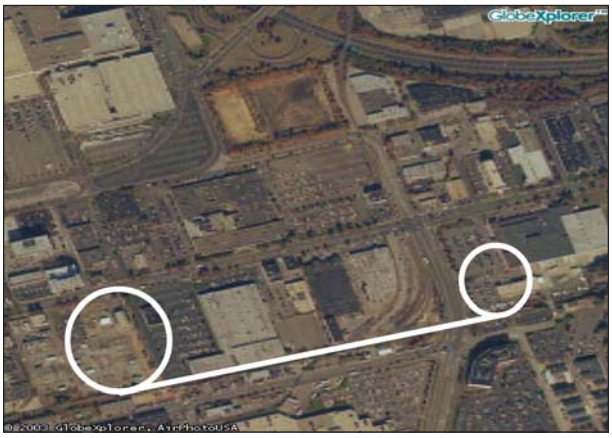
Project Fact Sheet

Long Island HTS Power Cable



This project involves the demonstration of a High Temperature Superconductor (HTS) power cable in the Long Island Power grid, spanning nearly half a mile and serving as a permanent link in the Long Island Power Authority's (LIPA) grid network. The cable will represent the world's first installation of a superconductor cable in a live grid at transmission voltages.



The cable will deliver enough power to serve 300,000 homes in a very congested area of Long Island.

What are its Primary Applications?

HTS power cables are used for electric transmission and distribution. The Long Island cable will carry electricity at transmission voltage, which is how power is delivered over long distances.

What are the Benefits to Utilities?

Investment in electrical transmission and distribution infrastructure gained importance in the wake of the August 2003 blackout in the northeast. It became apparent during the blackout and the investigations that have followed that new technologies are required to relieve constraints on the grid, particularly in the most populated and power-hungry areas of the nation. Rapidly growing demand constantly challenges utilities to find new ways to conduct electricity to where it is needed, safely and reliably.

Siting new transmission lines has become a formidable challenge to utilities in congested areas such as Long Island. A high-temperature superconductor (HTS) cable can carry several times more current than a conventional copper cable with the same diameter.

What is the Status of the Project?

The project was awarded in 2003, and the team is currently focusing on the design of the cable, terminations, and refrigeration system.

Office of Electric Transmission and Distribution, TD-1
U.S. Department of Energy – 1000 Independence Avenue, SW – Washington, DC 20585.

Goal:

To demonstrate a 2,000 foot, 600 megawatt HTS power transmission cable operating at 138 kV in the Long Island Power Grid, the first ever installation of a superconductor cable in a live grid at transmission voltages.

Team:

American Superconductor (HTS wire and project lead)

Nexans (cable manufacturing)

Air Liquide (Refrigeration system)

Long Island Power Authority (Host utility)

Period of Performance:

3/2003-12/2006

Cumulative Project Funding:

Private $15.20 Million (50%)
DOE $15.20 Million (50%)
Total: $30.39 Million

What is it?

A power cable is designed to carry large amounts of electrical current over short or long distances.

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HTS cables can be installed in existing rights-of-way, helping to reduce the cost and environmental impact of grid upgrades.

What is the Market Potential?

The Edison Electric Institute estimates that the U.S. transmission grid requires an investment of $56 billion over ten years to meet new demands and maintain reliability. Much of that amount will go towards expanding power transmission capabilities.

As energy demands increase and environmental concerns heighten, underground HTS cable will provide the necessary alternative to meet power supply needs. The development of commercially viable HTS transmission cable will allow U.S. industry to capture a large portion of the growing national market. In addition, international markets are estimated to be 10 times larger than the U.S. market, and growing more rapidly.

Superconducting cables have the potential to create an efficient "electricity superhighway," much like the advent of fiber optic cable has aided the development of the "information superhighway."

What are the Project Accomplishments to Date?

American Superconductor has built the world's first commercial volume HTS wire manufacturing plant in Devens, Massachusetts, and wire for the cable is being manufactured at the new facility. The wire will be shipped to Nexans for assembly of the cable, then returned to New York for installation.

The cable will be installed underground in an existing right of way in East Garden City, Long Island. With a capacity of 600 megawatts, the 138 kV cable is capable of delivering power to 300,000 homes, and will be an integral part of the LIPA grid. The project team expects the cable to be installed by the end of 2005.

After an initial operational period followed by performance and economic reviews of the cable system, LIPA plans to retain the new superconductor cable as a permanent part of its grid.

LIPA and American Superconductor are also formulating plans to install high capacity, low environmental impact HTS cables elsewhere in the LIPA grid to address the growing electric power needs on Long Island.

How Does it Work?

HTS wires today can conduct more than 140 times the power of copper or aluminum wires of the same dimensions. This allows cables made from HTS wires to carry more power in existing rights of way than conventional cables or overhead lines. Also, conventional wires made from copper or aluminum conductors have resistance, and some of the electric power is lost as it fights that resistance while passing through the cables. The current in the Long Island cable is carried through HTS wires, which exhibit zero resistance when cooled to about -321 degrees Fahrenheit with liquid nitrogen.

Alignment with Administration Priorities:

National Energy Policy: " …expand the Department's research and development on transmission reliability and superconductivity"

National Transmission Grid Study: " … accelerate development and demonstration of its technologies, including high-temperature superconductivity…

Secretary of Energy: "… focuses R&D dollars on long-term, potentially high-payoff activities that require Federal involvement to be both successful and achieve public benefit."

Energy Information Administration: "of [advanced power delivery] technologies, superconductivity holds the most promise for yielding significant efficiency gains."